

XXXII. *Observations made at Leicester on the Transit of Venus over the Sun, June 3, 1769. By the Reverend Mr. Ludlam, Vicar of Norton, near Leicester.*

Read Nov. 16, 1769. **T**HE telescope, used for viewing the planet, was made by Mr. Dollond, with a triple object glass of $33\frac{1}{7}$ inches focal distance, and was found by experiment to magnify 54 times. The clock was firmly fixed; its pendulum rod was made of wood. The transit telescope was not accurately adjusted either to the meridian or horizon, but the transits of the Sun and of η Bootis registered below are sufficient to show the rate of the going of the clock, and the corresponding altitudes of the Sun, its error a few days before the transit of the planet; whence the necessary reduction of the time then shewn by the clock to apparent time may be easily derived.

Observa-

Observations for examining the clock.

Day of the month, 1769.		TRANSITS.						Object
		Time by the Clock.						
		First Wire.	Passage over Meridian.			Third Wire		
		' "	h	' "	' "	' "		
May	28	17 12	IX	18 0	18 47½	} Sun	Bootis	
		Clouds		Clouds	Clouds			
		Clouds	XXIII	59 1	59 50			
	29	13 19½	IX	14 7½	14 54		Bootis	
31	56 29	XXIII	57 17½	58 6½	} Sun			
	58 46		59 35	0 23½				
June	1	56 39	XXIII	57 28½	58 17	} Sun		
		58 56		59 46	0 34			
	2	57 43½	VIII	58 32	59 19		Bootis	

Corresponding altitudes of the Sun, taken by reflection from water, with an Hadley's quadrant of six inches radius.

Sun's double alt. 79° 54'

May 29, 1769

	Time by the Clock					
	Eastern Az.		Western Az.		Meridian	
	h	' "	h	' "	h	' "
<i>Up. limb</i>	VIII	28 33	III	27 39	XI	58 6
<i>Center</i>		30 17½		25 51½		4½
<i>Low. limb</i>		32 8		23 57½		2½
Mean					XI	58 4½

Sun's

Sun's double alt. $82^{\circ} 55'$

May 29, 1769

	Time by the Clock								
	Eastern Az.			Western Az.			Meridian		
	h	'	"	h	'	"	h	'	"
<i>Up. limb</i>	VIII	39	0	III	17	8	XI	58	4
<i>Center</i>		40	$51\frac{1}{2}$		15	18			$4\frac{3}{4}$
<i>Low. limb</i>		42	$42\frac{1}{2}$		13	25			$3\frac{3}{4}$
Mean							XI	58	$4\frac{1}{8}$
Mean of both sets				h	'		XI	58	$4\frac{7}{16}$
Cor ⁿ for the interv.				7	0				$7\frac{5}{8}$
Passage over meridian							XI	57	$56\frac{2}{3}$
Equat. of time								3	3
Clock faster than mean time									$59\frac{2}{7}$

Sun's double alt. $96^{\circ} 58'$

June 2, 1769

	Time by the Clock.								
	Eastern Az.			Western Az.			Meridian		
	h	'	"	h	'	"	h	'	"
<i>Up. limb</i>	IX	27	50	II	29	44	XI	58	47
<i>Center</i>		29	57		27	41			49
<i>Low. limb</i>		32	$1\frac{1}{2}$		25	36			$48\frac{3}{4}$
Mean				h	'		XI	58	48,25
Cor ⁿ for interv.				5	0				5,65
Passage over meridian							XI	58	42,6
Equat. of time								2	28,4
Clock faster than mean time								1	11

If we suppose the clock to be $1' 11''$ faster than mean time, on June the second at noon, and to gain at the rate of $2\frac{1}{2}$ seconds in a day, then at the time of the transit of the planet it was one minute and one second slower than apparent time.

At VII^h 6' 0'', according to the time shewn by the clock, a small indenture appeared on the Sun's limb; the increase of it at VII^h 6' 14'', shewed plainly that it was made by the expected planet.

The

The internal contact was first noted at VII^h 23' 56"; at VII^h 24' 8", the divided part of the Sun's limb seemed wholly united.

The edge both of the Sun and Planet were in a continual tremor; at the internal contact the limb of the Sun seemed, for several seconds, to be alternately united and again separated by a kind of shootings of the Planet.

These observations, reduced to apparent time, give the external contact at VII^h 7' 1", the internal contact at VII^h 25' 9", the duration 18' 8".

The solar eclipse was observed by the same clock and telescope. It was manifestly begun at XVIII^h 34' 26", according to the time shewn by the clock. The ending was exactly noted at XX^h 20' 8". The Sun's limb appeared very well defined all the morning. These observations, reduced to solar time, make the beginning of the eclipse at XVIII^h 35' 21", the end at XX^h 21' 2", the duration 1^h 45' 41".

Observations made at Leicester, with an Hadley's quadrant, of six inches radius, for determining the latitude of the place.

1769			0	'
April 27	Sun's diameter on quadrantal arch			32
	on arch of excess			33
	repeated on quad. arch			32
	on arch of excess			32
	Sum of the meridian altitude of the Sun's upper limb, and its depression, when reflected by water		103	20 $\frac{1}{2}$
	of the lower limb		102	18
29	Sun's diameter on quadrantal arch			32 $\frac{1}{2}$
				April

	0	'	"
1769			
April 29		32	
		33	
		32 +	
	104	36	
	103	31	
June 11		33	
		30	
		33	
		30	
	121	36 $\frac{1}{2}$	
	120	33	
		33 $\frac{1}{2}$	
15		30	
		33 $\frac{1}{2}$	
		30	
	122	2 $\frac{1}{2}$	
	121	59 $\frac{1}{2}$	

	0	'	"
The latitude of Leicester, deduced from the observations of April 27, is	52	36	21
of April 29,	52	37	3
of June 11,	52	37	35
of June 15,	52	37	12
Mean of these four observations	52	37	3
The latitude of Market Harborough, in Leicestershire, from the mean of several accurate observations of the Sun's image, projected into a dark room, by S. Rouse	52	28	30